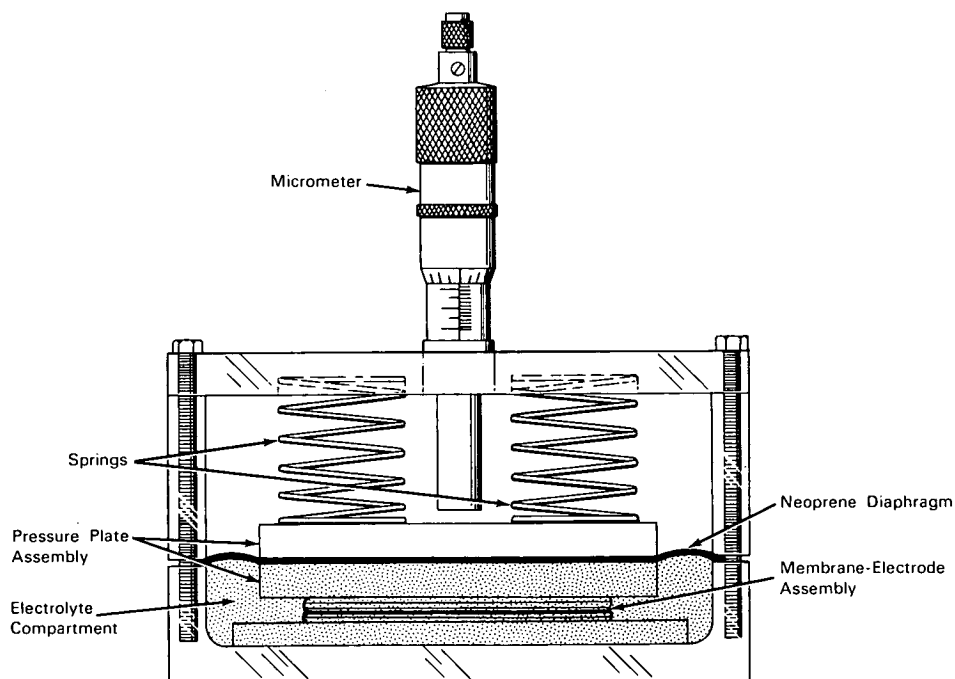


NASA TECH BRIEF



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Apparatus Measures Swelling of Membranes in Electrochemical Cells



The problem: To measure with a high degree of accuracy the swelling characteristics of polymer membranes used as electrode separators in alkaline electrochemical cells. Existing testing methods are incapable of accurately measuring the amount of swelling and the force exerted by the expanded membrane against the cell walls. These characteristics must be accurately controlled in order to ensure optimum cell operation.

The solution: A measuring apparatus that includes four springs of known spring constant, a pressure-plate unit, and a micrometer caliper head.

How it's done: A dry membrane-electrode assembly is placed beneath the pressure plate in the apparatus and the micrometer is adjusted to obtain a zero reading of the thickness of the membrane-electrode assembly and the spring compression. The compartment containing the assembly is then filled with the electrolyte solution and placed under vacuum (5" of Hg) to rid the assembly of entrapped air. When the system reaches equilibrium (after release of the vacuum), the micrometer reading gives a measure of the expansion or swelling of the membrane and the compression of the springs. The force exerted by the

(continued overleaf)

membrane assembly is computed from the micrometer readings and the value of the spring constant.

Notes:

1. This apparatus should be of value to designers of electrolytic cells or other devices where the swelling characteristics of membranes must be accurately controlled.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland, 20771
Reference: B65-10087

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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